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M E T A L V E R T E X

the Pinnacle of Sound

Metal Vertex 60

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ANTI-MODULATION NOISE CASSETTE MECHANISM
THREE-PIECE CONSTRUCTION
Techno-Silver Back Coat

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IF GOD EVER SPEAKS TO YOU, THIS IS THE TAPE TO RECORD IT ON.

There are some things you want to record with absolute accuracy. Which is why Maxell has created Metal Vertex — the most precise audio cassette ever.

52% LESS MODULATION NOISE.

And that's compared to our top-of-the-line MX tape. Thanks to a sturdier, fiber-glass-reinforced guideblock, steel pins, wider pressure pad, and high precision crown-shaped rollers, Metal Vertex virtually eliminates tape fluctuation. Plus our proprietary Techno-Silver backcoating reduces friction and further improves tape-running stability. All of which makes for a tape with the lowest modulation noise level available. Anywhere.

A REVOLUTIONARY NEW CASSETTE SHELL.

To better absorb outside vibrations, our new three-piece shell is made of a highly visco-elastic, super composite material with almost twice the specific gravity of that found in most cassettes. Yet what

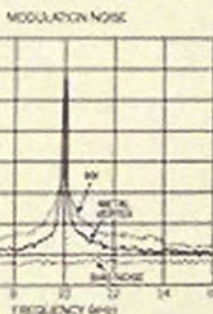
makes this mechanism truly unusual is the golden emblem center, which is not simply decorative but serves to dampen external vibrations even further. Bad vibes aside, our new Metal Vertex cassette shell also provides unmatched durability and heat resistance.

WIDER DYNAMIC RANGE AND THE HIGHEST MOL IN EXISTENCE.

The Metal Vertex magnetic coating consists of extremely fine (.3 micron) metal particles, packed together with high density through a process called parallel bundling. That not only increases dynamic range, it pushes the Maximum Output Level 1db to 2db higher than our MX tape (depending on frequency). That, in turn, allows for a substantial improvement in sensitivity and an astonishing 40% reduction in distortion.

If you're surprised by all these incredible specs, don't be. Remember, Maxell has always been at the forefront of creating magnetic tape for the world's most sophisticated equipment. So if what you're recording demands superior reproduction, look to Metal

Vertex from Maxell. Anything less and you don't have a prayer.



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Metal Vertex

What was once only an audiophile's dream is now a reality with Maxell Metal Vertex. Now, you can enjoy a whole new dimension in sound.

Ultra-low modulation noise, ultra-wide dynamic range, superior running and external vibration absorption are only a few of the features that combine to make Metal Vertex the pinnacle in sound reproduction.

Ultra-low Noise Modulation

The only way to achieve the ultimate in pure sound reproduction and dynamic range is to attain ultra-low modulation noise.

Hiss or bias noise (primary noise) is well known as a problem in audio tape. Another problem is modulation noise or secondary noise.

Unlike hiss, modulation noise occurs only after a signal is recorded on the tape. For instance, the recorded signal of a music performance includes signals for a wide range of frequencies, from very low to very high.

Using the 10 kHz signal, as shown in Fig. 1, when this signal is recorded on and reproduced from cassette tape the signal also includes a small amount of 9 kHz, 11 kHz and other frequencies. This is what we call secondary, or modulation noise, which causes frequencies other than the originally recorded frequency to be reproduced and therefore contaminates, however slightly, the purity of sound reproduction.

Metal Vertex

A Breakthrough in Secondary Noise Reduction

Modulation noise occurs when the signal transfer between the head and the tape does not happen smoothly (Fig. 2). A number of complex factors are involved, but the principal ways to reduce modulation noise are to improve the smoothness of the magnetic surface, to stabilize the tape while running, and to reduce tape vibration.

Metal Vertex tape not only features unprecedented smoothness in its magnetic film surface, but also achieves greater stability in tape running through the use of a newly developed special back coating.

In addition, the new materials used in the cassette mechanism itself reduce minute vibrations of the tape. All of this combines to achieve world-class ratings in low modulation noise performance, permitting the flawless reproduction of digital sound.

A New Dimension in Dynamic Range

Dynamic range determines whether or not a tape can equal the magnificent sound energy of the original performance. So, we expanded the dynamic range to produce the ultimate cassette tape.

Metal Vertex tape not only features improvements in the magnetic material, but also employs new multi-orientation and high-packing technology in the tape production process. This is what gives Metal Vertex its ultra-wide dynamic range.

Revolutionary Techno-Silver Back Coating

Maxell's revolutionary Techno-Silver Back Coating achieves superior runnability by combining two new concepts: a smoother magnetic surface and minimal friction, to produce the ultimate in ultra-low modulation noise.

Fig. 5 Five-Layered Structure of the Tape

Smoother Magnetic Surface

To reduce modulation noise a smoother magnetic surface is required because improved head contact with the tape reduces signal fluctuations. Technologically advanced manufacturing allows Maxell to produce a smooth base film and to make a smooth finish on the surface of the magnetic coating.

ULTRA-SMOOTH SSS BASE FILM

The base film serves as the foundation for the magnetic coating. Uneven spots on the base film naturally make it more difficult to produce a smooth magnetic surface. Metal Vertex makes use of a DAT-class ultra-smooth SSS (super smooth and strong) base film superior to that used in conventional audio tape. (Fig. 3).

ULTRA-SMOOTH CALENDERING

After the magnetic layer is coated, the tape passes between tightly engaged heated rollers to smooth out the surface. This is called the calendaring process. The key to achieving this ultra-smooth magnetic surface, is in the mirror smoothness of the rollers themselves. Along with the SSS base film, this new calendaring is the first step in achieving low modulation noise levels (Fig. 4).

Stable Tape Runnability

The next step in achieving ultra-low modulation noise is improved tape running stability. Reducing tape flutter and maintaining proper head contact both tend to reduce modulation noise. Maxell's solution, based on tape design, is its Techno-Silver Back Coating.

TECHNO-SILVER BACK COATING

Making the magnetic surface smoother requires a smooth base film, but this increases friction with the tape guide mechanism, which is in direct contact with the back side of the tape, and reduces running stability. So, Maxell had to reduce the frictional resistance on the back of the tape. After studying many types of material to find the one that has the optimal friction coefficient with the tape guide, Maxell's research led to its proprietary Techno-Silver Back Coating (patent pending Fig. 5), which gives it superior running performance.



Fig. 1 Modulation Noise

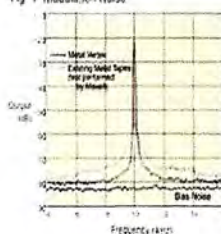
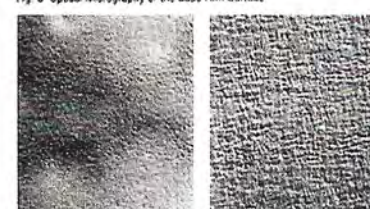


Fig. 2 Causes of Modulation Noise



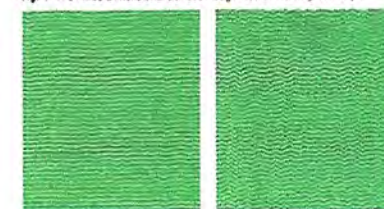
Fig. 3 Optical Micrograph of the Base Film Surface



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Existing Product
(test performed by Maxell)

Fig. 4 The Three-Dimensional Surface Roughness of the Magnetic Layer



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Existing Product
(test performed by Maxell)

Anti modulation noise cassette mechanism—a deeper structure

Maxell's AM Cassette mechanism reduces surface friction and improves perpendicularity. The new materials and design used in the FRT (Fiberglass Reinforced Thermosetting) guide block embody the superior performance characteristics of this new 3-piece shell mechanism resulting in ultra-low modulation noise.

Tape Running Stability

Additional improvements in the cassette mechanism reduce the level of modulation noise even further. The newly developed AM (Anti-Modulation Noise) cassette mechanism, which represents a modulation noise reduction approach from the mechanism design angle, offers a 3-piece structure as the most significant advantage (Fig. 6).

FRT GUIDE BLOCK

Perhaps the most significant element is the FRT (Fiberglass Reinforced Thermosetting) guide block (patent pending, Fig. 7). The cassette guide block, together with the deck mechanism, has a tremendous impact on tape running stability.

Metal Vertex tape uses a new highly wear-resistant yet low-friction fiberglass reinforced resin to achieve smooth tape running. A redesigned 3-piece structure further increases the perpendicularity of the tape guide. Maxell's own high-precision molding process yields much higher perpendicularity and phase precision than was possible in the past.

NEW BF PADS

Metal Vertex tape makes use of new BF (Best Fit) pads to hold the tape against the heads with optimal pressure. Maxell also widened the pad surfaces in order to improve contact with the heads (Fig. 8).

HIGH-PRECISION PARTS

The new SS (Super Smoothing) guide rollers play an important role in controlling the tape running position. The new SS rollers are high-precision guide rollers featuring a crown-shaped tape contact surface that ensures that the tape never deviates from the center of the roller (Fig. 9).

Its two-piece hub and QL (Quin-Lok) clamps are designed to make the rollers perfectly cylindrical and circular. This helps prevent tape deformation and curling, resulting in more stable tape running. The tape step also makes use of a high-precision QL clamp integrated with the hub. The S-TA (Silent Tri-Arch) slip sheet also guides the tape away from the sides of the mechanism, and gives more stable tape running as well as improved winding performance.

Fig. 6 AM Cassette Mechanism

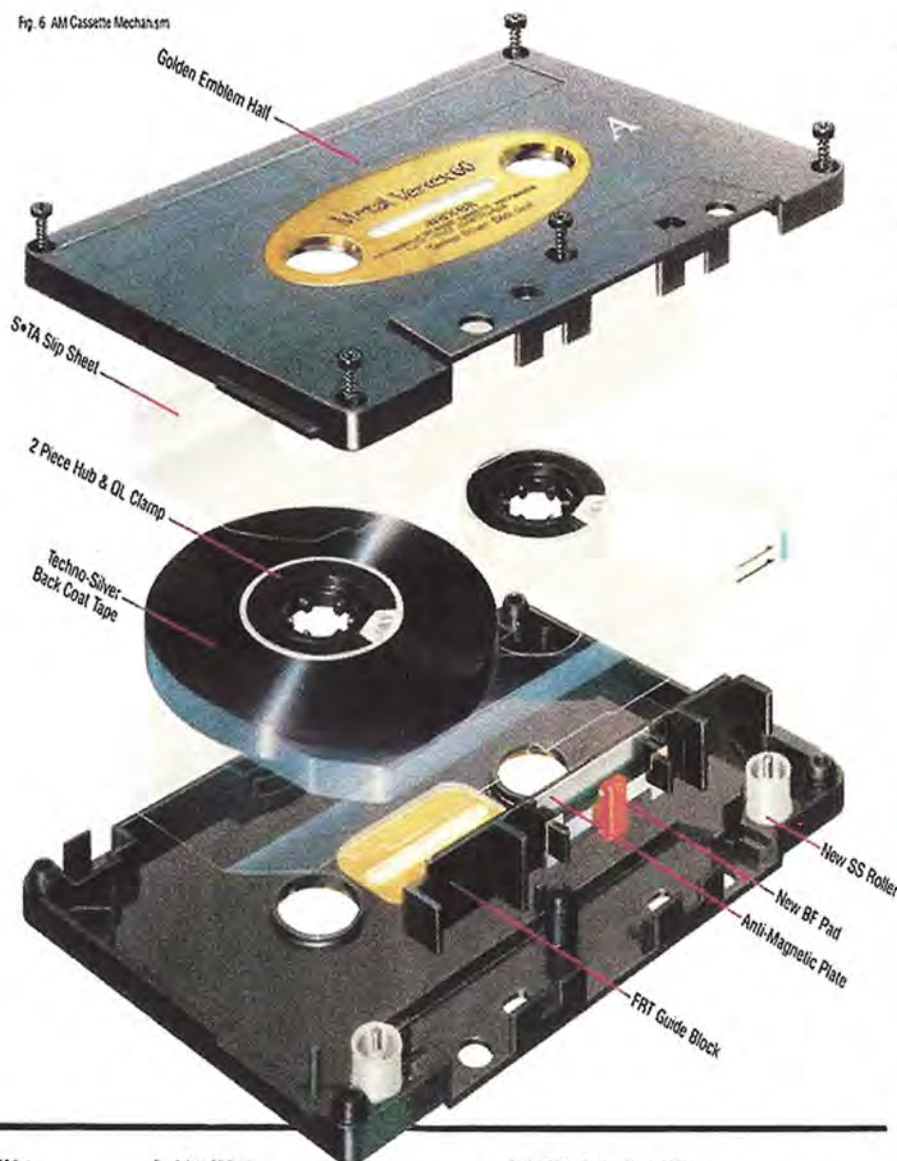


Fig. 7 FRT Guide Block

Fig. 8 New BF Pad

Fig. 9 New SS Roller

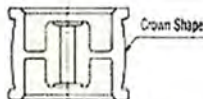
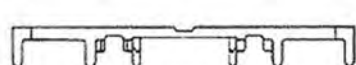
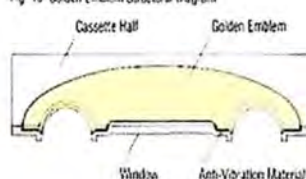


Fig. 10 Golden Emblem Structural Diagram



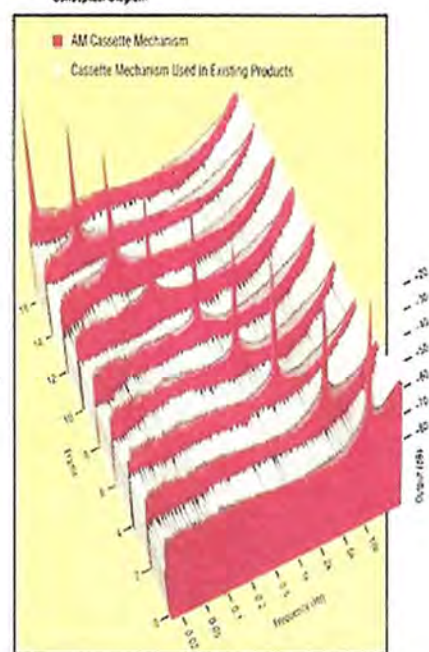
Anti-Vibration "Golden Emblem"

The Golden Emblem (patent pending) is the essence of Metal Vertex. However, the Golden Emblem is not simply a decoration; it is an anti-vibration material placed on the top half of the cassette to further absorb vibrations. (Fig. 10) Along with double the specific gravity and visco-elasticity of the super-composite materials, the Golden Emblem Hall offers three layers of protection against vibration. Protection which dramatically increases the cassette's ability to suppress vibrations and results in ultra-low modulation noise levels. (Fig. 11).

Suppressing External Vibrations

Basically, cassette tape cannot avoid being subject to minute amounts of vibration from the motor and other parts of the cassette deck drive mechanism. If the cassette shell transmits those vibrations to the tape, it results in more tape vibration and, in turn, more modulation noise. Maxell's exclusive Golden Emblem Hall eliminates virtually all external vibrations.

Fig. 11 Three Dimensional Modulation Noise Conceptual Diagram



"Modulation Noise" refers to the sound components that occur in the vicinity of the frequency when a specific single frequency is to be reproduced. Fewer components mean a greater degree of fidelity to the original sound.

The above graph is a 3 dimensional representation of the modulation noise associated with reproduced signals at various frequencies. The AM cassette mechanism based on the super-composite material shows lower modulation noise levels at every frequency.

A new standard of reliability

Maxell Metal Vertex tape is the culmination of a wide range of technical achievements. Even when the tape is used repeatedly or in varying environments it performs flawlessly. Designed for durability and heat resistance, Metal Vertex offers the ultimate in reliability.

NEW HIGH ENDURANCE BINDER

The new HE (High Endurance) Binder is a three-dimensional grid-like structure designed to hold the magnetic particles in place (Fig. 15).

The addition of hard, durable fine ceramic particles gives the magnetic surface added wear-resistance and dramatically increases its durability. Increasing the cross-linkage density also contributes to the high packing density of the magnetic particles.

AM CASSETTE MECHANISM

A tape is supposed to run perpendicular to the head gap. If the tape is even slightly distorted or if it wanders above or below where it should, the left and right channel outputs become unsynchronized. This is known as phase differential, and the result is displacement of sounds that should strike the ear simultaneously. This problem causes blurred sounds.

Since one of the causes of phase differential is deformation of the cassette shell at high temperatures, the AM cassette mechanism was designed to have a high level of heat resistance.

This means that the listener not only can enjoy ultra-low modulation noise, but also is able to hear accurately reproduced sounds even in high temperature environments.

With Metal Vertex, the listener is assured of a consistently accurate phase relationship, which makes for precise right-and-left channel separation and a stunning life-like depth in the sound image.

Fig. 15 Conceptual Diagram of New HE Binder



Metal Vertex The Ultimate Tape

Providing low and midrange sound energies and suppression of high range noise is no simple task. Even a very powerful sound is made up of a multitude of separate sounds from distinct rhythms and melodies. Today's technology makes it possible to store these sounds from a digital source, but they have to be accurately reproduced.

That is why Maxell perfected both the tape and the cassette mechanism to achieve ultra-wide dynamic range and ultra-low modulation noise.

All of Maxell's technological advancements work in harmony to produce precision sound reproduction. Microlevel technology makes Maxell's Metal Vertex The Pinnacle-of-Sound.



Metal Vertex

Tape Specifications

Physical Properties	Backing Material		—	SSS Film
	Tape Width		mm	3.81
	Coating Thickness		μm	4.0 (Back 1.0)
	Total Thickness		μm	12.5
	Yield Strength		N	6
	Breaking Strength		N	11
Magnetic Properties	Magnetic Material		—	Super Energy Pure Metal
	Coercivity		kA/m (Oe)	95 (1200)
	Retentivity		mT (G)	360 (3600)
	Squareness		—	0.94
	Optimum Bias ¹		dB	0
Electrical Properties	Sensitivity ¹	315Hz	dB	+1.0
		6.3kHz	dB	+2.5
		12.5kHz	dB	+3.5
		16.0kHz	dB	+4.5
	Output Uniformity	315Hz	dB	0.3
		8kHz	VU	0.4
	M.O.L.	315Hz	dB	+8.0
		10kHz	dB	+3.0
	AC Bias noise		dB	-60.5
	Erasing effect		dB	80
	Print-through		dB	59
	Dynamic Range	315Hz	dB	68.5
10kHz		dB	63.5	

1) Deviation from Maxell reference tape.

Metal Vertex is presently available in 90 min. length only.

All features and specifications subject to change without notice.

Test Conditions

Measuring Deck:	Maxell Reference Deck
Tape Speed:	4.76 cm/s
Measuring Track Width:	1.5 mm
Record Head Gap Length:	3.0 μm
Playback Head Gap Length:	1.0 μm
Reference Output Level:	250 nWb/m
Reference Tape:	Metal 421
Playback Equalizer:	T ₁ =3180 μs T ₂ =70 μs
Bias:	Specified Bias Current of Reference Tape
M.O.L.:	315 Hz (Playback Output Level at 3% THD) 10 kHz (Saturation Output Level)
Bias, Sensitivity:	Indicated Deviation from Maxell Reference Tape
Measuring Magnetic Field:	400 kA/m (5,000 Oe)

Values are representative ones obtained through testing cassettes selected at random.

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